

WHAT IS CLAIMED IS:

1. A blood separating instrument comprising:

a blood collection means for containing collected blood;

a filtration means for separating blood cell and blood

5 plasma in said collected blood;

a blood cell collection means for containing separated blood cell;

a blood plasma collection means for containing separated blood plasma; and

10 a pressure applying means for applying pressure to the blood contained in said blood collection means;

wherein, said filtration means includes a capillary having one end in communication with a blood discharging section of said blood collection means and the other end in communication 15 with a blood cell introducing section of said blood cell collection means, said capillary having a plurality of perforations formed through a wall thereof, each of said perforation having a size to allow the blood plasma to pass therethrough but to prevent the blood cell from passing 20 therethrough;

said instrument characterized in that the blood in said blood collection means is introduced into said filtration means by a pressure applying motion caused by said pressure applying means, and the blood plasma in said blood moves through said 25 perforations in said filtration means to be separately contained in said blood plasma collection means.

2. A blood separating instrument comprising:

a main container body having a blood collection container

portion for containing collected blood, a blood plasma collection container attaching/detaching portion in communication with a blood discharging section of said blood collection container portion, and a blood cell collection 5 container attaching/detaching portion whose blood cell introducing section is in communication with said blood plasma collection container attaching/detaching portion;

a push-in cap having a push-in section which is adapted to be fittingly inserted into said blood collection container 10 portion;

a blood plasma collection container detachably connected with said blood plasma collection container attaching/detaching portion and containing a predetermined amount of blood plasma dilution;

a blood cell collection container detachably connected with said blood cell collection container attaching/detaching portion and containing a predetermined amount of blood cell protective solvent; and

an ultrafiltration element for separating the blood cell 20 and the blood plasma in said blood;

wherein said ultrafiltration element has a group of capillaries made of filter paper each having one end in communication with said blood discharging section of said blood collection container portion and the other end in communication 25 with said blood cell introducing section of said blood cell collection container, said capillary having a plurality of perforations formed through a wall thereof, each of said perforation having a size to allow the blood plasma to pass therethrough but to prevent the blood cell from passing

therethrough;

5        said instrument characterized in that the blood in said blood collection container portion is introduced into said ultrafiltration element by a pushing-in motion of said push-in cap, and the blood plasma in said blood moves through said perforations of said ultrafiltration element to be separately contained in said blood plasma collection container.

10      3. A blood separating instrument in accordance with claim 2, in which an inner diameter of said perforation of the capillary is within a range of 0.4 to 0.6  $\mu$ m.

15      4. A blood separating instrument in accordance with claim 2, in which said blood collection container portion contains spherical solvent enclosed by a sheet wall arranged in a bottom portion thereof, and said push-in section of said push-in cap has an end portion capable of collapsing said sheet wall.

20      5. A blood separating instrument in accordance with claim 4, in which an outer diameter of each element of said spherical solvent is greater than the inner diameter of said perforation of said capillary.

25      6. A blood separating instrument in accordance with claim 2, in which a volume of said blood collection container portion is within a range of 80 to 120  $\mu$ liter.

7. A blood separating instrument in accordance with claim 2, further comprising a piston which divides the inside of said

blood cell collection container into an air layer region and a blood cell protective solvent containing region, and is capable of slidably moving therein.

5        8. A blood separating instrument in accordance with claim 7, in which a pressure in said air layer region is set to be a level 0.2 to 1.0 atm. higher than an outside pressure.

10      9. A blood separating instrument in accordance with claim 2, in which said blood plasma dilution is mixed with a predetermined amount of pigment.

15      10. A blood separating method comprising the steps of: collecting blood into a blood collection means; applying a pressure to said blood by a pressure applying means to introduce said blood into a filtration means whose one end communicates with a blood discharging section of said blood collection means;

20      containing blood plasma in said blood into a blood plasma collection means through perforations formed through a wall of said filtration means; and

25      making blood cell in said blood flow through said filtration means to be contained into a blood cell collection means through a blood cell introducing section of said blood cell collection means with which the other end of said ultrafiltration element communicates.

11. A blood separating method comprising the steps of: collecting blood into a blood collection container portion

of a main container body;

fittingly inserting and pushing-in a push-in cap into said blood collection container portion immediately after said collecting step to introduce said blood into a capillary of an 5 ultrafiltration element whose one end communicates with a blood discharging section of said blood collection container portion;

dissolving blood plasma in said blood through perforations formed through a wall of said capillary into blood plasma dilution contained in a blood plasma collection container 10 connected air-tightly with said main container body; and

making blood cell in said blood flow through said ultrafiltration element to be mixed into blood cell protective solvent contained in a blood cell collection container connected air-tightly with said main container body through a blood cell 15 introducing section of said blood cell collection container with which the other end of said ultrafiltration element communicates.

12. A blood separating method in accordance with claim 11,

20 further comprising the steps of:

pushing-in said push-in section of said push-in cap to the lowest level;

collapsing a sheet wall arranged in a bottom portion of said blood collection container for enclosing a spherical 25 solvent, and

filling up each of said capillaries with said spherical solvent to be coagulated therein.

13. A blood separating method in accordance with claim 11,

in which said blood is collected in an amount of 80 to 120  $\mu$  liter.

14. A preparing method for preparing a sample for  
5 quantification from a biological sample, which is to be used  
for quantifying elements to be quantified in said biological  
sample, said method characterized in comprising a step of mixing  
an unknown volume of biological sample collected without  
quantifying a volume thereof with a specified volume of aqueous  
10 solution.

15 15. A preparing method in accordance with claim 14, in which  
said specified volume of aqueous solution contains a specified  
amount of indicating material.

16. A preparing method in accordance with claim 14,  
characterized in further comprising a step of adding a specified  
volume of aqueous solution containing a specified amount of  
indicating material.

20 17. A preparing method in accordance with claim 14, in which  
said indicating material is a pigment or a chromogen.

18. A preparing method in accordance with claim 17, in which  
25 said chromogen is an oxidative coloring type chromogen.

19. A preparing method in accordance with claim 14, in which  
said biological sample is either one of a whole blood, a blood  
plasma or a blood serum.

20. A preparing method in accordance with claim 14, in which said aqueous solution is a buffer solution.

5 21. A preparing method in accordance with claim 14, in which said elements to be quantified are elements in the blood serum.

10 22. A quantifying method for quantifying elements to be quantified in a biological sample, said method characterized in using a sample for quantification prepared by a preparing method comprising a step of mixing an unknown volume of biological sample collected without quantifying a volume thereof with a specified volume of aqueous solution containing a specified amount of indicating material.

15 23. A quantifying method in accordance with claim 22, in which said unknown volume of biological sample collected without quantifying a volume thereof is mixed with a specified volume of aqueous solution.

20 24. A quantifying method in accordance with claim 22, said method characterized in further comprising the steps of:

determining a dilution ratio of said biological sample in said sample for quantification; and

25 quantifying a concentration of elements to be quantified in said sample for quantification.

25. A quantifying method in accordance with claim 22, in which said indicating material is a pigment or a chromogen.

26. A quantifying method in accordance with claim 25, in which said chromogen is an oxidative coloring type chromogen.

5 27. A quantifying method in accordance with claim 22, in which said biological sample is either one of a whole blood, a blood plasma or a blood serum.

10 28. A quantifying method in accordance with claim 22, in which said aqueous solution is a buffer solution.

15 29. A quantifying method in accordance with claim 22, in which said elements to be quantified are elements in the blood serum.

20 30. A container for preserving biological sample used for preserving an unknown volume of biological sample containing elements to be quantified, which has been collected without quantifying a volume thereof, until it will be quantified, said container being filled with a specified volume of aqueous solution, and said container having a closable opening/closing means for adding said biological sample.

25 31. A container for preparing a sample for quantification used for preparing a sample for quantification from an unknown volume of biological sample containing elements to be quantified, which has been collected without quantifying a volume thereof, said container being filled with a specified volume of aqueous solution, and said container having a closable opening/closing

means for adding said biological sample.

32. A container in accordance with claim 30, in which said specified volume of aqueous solution is a solution containing 5 a specified amount of indicating material.

33. A container in accordance with claim 32, in which said indicating material is a pigment or a chromogen.

10 34. A container in accordance with claim 33, in which said chromogen is an oxidative coloring type chromogen.

15 35. A container for collecting a biological sample in accordance with either of claim 30, in which said biological sample is either one of a whole blood, a blood plasma or a blood serum.

20 36. A container for collecting a biological sample in accordance with either of claim 30, in which said elements to be quantified are elements in the blood serum.

37. A quantifying method for quantifying elements to be quantified in a biological sample, said method comprising the steps of:

25 1) preparing a sample for quantification composed of an unknown volume of biological sample containing elements to be quantified, which has been collected without quantifying a volume thereof, and a specified volume of aqueous solution containing a specified amount of indicating material;

2) determining a dilution ratio (a) of said biological sample from a concentration ( $C_1$ ) of the indicating material in said specified volume of aqueous solution containing said specified amount of indicating material and a concentration ( $C_2$ ) of the indicating material in said sample for quantification;

5       3) determining a concentration (Y) of the elements to be quantified in said sample for quantification; and

10      4) determining the elements to be quantified in the biological sample based on the dilution ratio (a) of the biological sample determined in the step 2) and said concentration (Y) of the elements to be quantified in the sample for quantification determined in the step 3).

15      38. A quantifying method in accordance with claim 37, in which said aqueous solution is a buffer solution.

39. A method in accordance with claim 37, in which said indicating material is a pigment or a chromogen.

20      40. A method in accordance with claim 39, in which said chromogen is an oxidative coloring type chromogen.

25      41. A method in accordance with claim 39, in which an absorptivity ( $E_1$ ) of said specified volume of aqueous solution containing said specified amount of indicating material and an absorptivity ( $E_2$ ) of said sample for quantification are used in substitution for  $C_1$  and  $C_2$  respectively.